Overcoming Silo Thinking in the IS Discipline by Thinking Differently about IS and IT

Full Paper

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Abstract

This essay challenges fundamental, silo-oriented assumptions about the IS discipline. It shows how work system theory and its extensions form a potential basis for overcoming that silo-orientation and finding and exploiting areas of overlap with other disciplines. Within the IS discipline, this paper shows how WST and extensions provide a basis for thinking differently about fundamental topics including the following: IS as a system-related discipline, system usage, sociotechnical systems, planned and emergent change in systems, system development and systems analysis and design, user participation and IS/IT projects, attaining value from IS and IT, IS success, business/IT alignment, and IS theories and a body of knowledge for IS. This paper also shows directions toward synergies and possible collaborations with other disciplines that build on areas of overlap.

Keywords

Information systems discipline, work system theory, sociotechnical systems, systems analysis and design

Moving Beyond Silo Thinking in the IS Discipline

Shortcomings of silo thinking have been lamented ever since the term "functional silo syndrome" apparently was coined in Ensor (1988). Silo thinking is inward-looking and self-referential. Its "circle the wagons" approach conflicts with powerful business trends toward less patience with artificial barriers and backward-looking intentions. Today's business trends encourage:

- elimination of silos, barriers, and turf wars (Serrat 2010; Pendall et al. 2013; Hecht et al. 2014),
- working across functions (Yip et al. 2011 ; Majchrzak et al. 2012; Bruns 2013)
- open innovation (Chesbrough 2003; 2011),
- co-creation of value (Prahalad and Ramaswamy 2004; Vargo and Lusch 2008; Grönroos 2011)
- agility and lean approaches (Beck et al. 2001; Ambler 2014, Spear and Bowen 1999)
- disruptive innovation (Christensen and Overdorf 2000; Christensen 2013)
- design thinking (Owen 2007; Brown 2008; Pourdehnad et al. 2011)

Conflicting with those trends are the academic IS discipline's persistent difficulties in explaining and justifying its place in a rapidly changing world. Conferences and journals repeatedly feature editorials, panels, position papers, and debates about topics such as:

- Trying to maintain the IS discipline's uniqueness, health, and significance. (e.g. Orlikowski and Iacono 2001; Benbasat and Zmud 2003; Agarwal and Lucas 2005; King and Lyytinen 2006a, 2006b; Winter and Butler 2011; King 2013; Hassan 2014; Johnston and Riemer 2014)

- Calling for rigor and relevance in IS research (e.g., Lee 1999; Applegate and King 1999.)
- Clarifying relationships between IS and "reference disciplines" such as management or economics (e.g., Keen 1980; Baskerville and Myers 2002; Grover et al. 2006; Wade et al. 2006)
- Establishing distinctions between native theories created within IS versus imported theories (e.g., Hassan 2006; Niederman et al. 2009; Straub 2012)
- Finding ways to rationalize and accept previously marginalized types of research such as action research and design science research. (e.g., Sein et al. 2011; March and Smith 1995; Hevner et al. 2004, Österle et al. 2011; Gregor and Hevner 2011; Levy and Hirschheim 2012).

Questioning whether the espoused uniqueness of IS is genuinely beneficial. Underlying the above discourse is a largely taken-for-granted assumption that the IS discipline's health depends on defining and justifying academic turf claims. That assumption and related strategizing reflect a defensive posture concerning legitimacy in academia, political power, careerist concerns, and related issues for individuals, departments, and the entire discipline. While important, those issues are basically about defending existing interests within the discipline. They ignore maximizing benefits for outside stakeholders including individuals, business, government, and society. Not one of the trends mentioned at the outset implies that IS should become more insular and more separate from other disciplines. The trends argue for reducing barriers and increasing cross-fertilization with other disciplines.

A fundamentally different approach. This essay pursues the AMCIS 2015 Blue Ocean theme of moving beyond past assumptions and restrictions by challenging silo-oriented mantras of separation and uniqueness. IS touches most significant business and government functions and activities. It should build on its special strengths as the discipline that most fully addresses the application and pervasiveness of IT.

The proposed path forward uses work system theory (Alter 2013) and its extensions to visualize directions for overcoming silo-orientation and exploiting areas of overlap with other disciplines. WST and extensions provide a basis for thinking differently about fundamental topics that touch IS itself and other disciplines in a variety of ways:

- IS as a system-related discipline
- system usage
- sociotechnical systems
- planned and emergent change in systems
- system development and systems analysis and design
- user participation and IS/IT projects
- attaining value from IS and IT
- IS success
- business/IT alignment
- IS theories and a body of knowledge for IS

Seeing those topics through a WST lens facilitates synergies and possible collaborations with other disciplines that build on areas of overlap.

Building on strengths. Each subsection of this paper points to applying the discipline's strengths and research traditions in areas that recognize the importance of IT while also assuming that IT-enabled systems are not fundamentally about IT. The IS discipline is primed to move in that direction because its traditional core in systems analysis and design already has many ideas and techniques that can be applied more broadly than in guiding IT specialists.

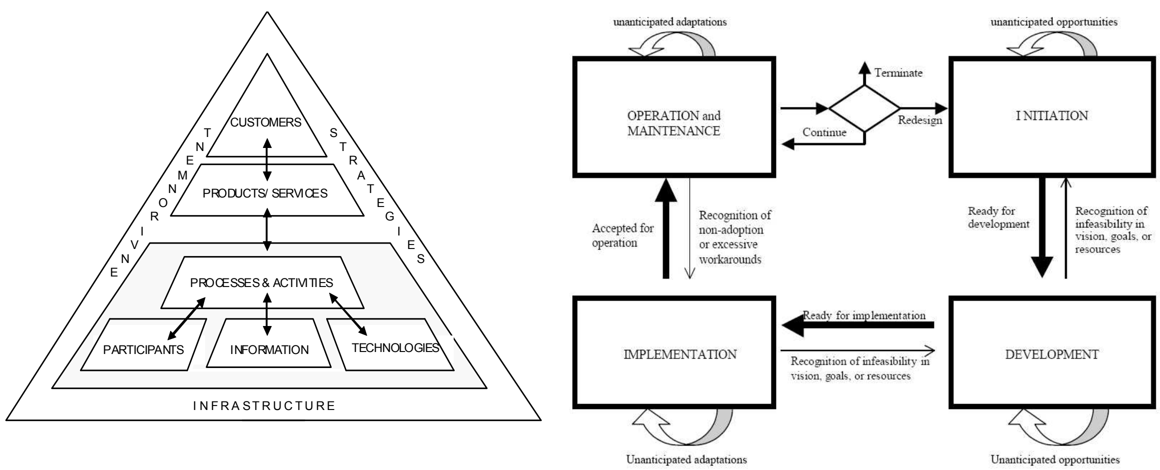
Organization. Since WST and many extensions were discussed in Alter (2013; 2015c) and other publications related to work system method (WSM), this paper provides only a brief summary of WST and a metamodel that reinterprets elements of the work system framework in a more detailed way. It shows how WST provides a potentially beneficial path toward thinking differently about each fundamental topic mentioned above. It also summarizes how WST resides in an area of overlap between IS and seven other disciplines, thereby providing a path for possible synergies and collaborations.

Summary of Work System Theory and a Related Metamodel

WST encapsulates a perspective for understanding systems in organizations by viewing them as work systems. Figure 1 (Alter 2015c) summarizes WST by identifying WST's three central components: 1) the definition of work system, 2) the work system framework, which provides a static view of a work system during a period when it is relatively stable, and 3) the work system life cycle model (WSLC), which provides a dynamic view of how a work system changes over time. Alter (2013) provides a detailed summary of WST, its application in the work system method (WSM), and various extensions, including a metamodel (Figure 2).

Alter (2013) uses Gregor's (2006) classification of theory types to explain that WST belongs in the same general categories of theory as actor network theory, activity theory, coordination theory, institutional theory, practice theory, and sociotechnical theory, all of which are useful in certain situations but none of which is falsifiable in a general sense. Such theories clearly do not fit the Gregor type IV category (theory for explanation and prediction) that describes the technology acceptance model (Davis 1989) and the theory of planned behavior (Ajzen 1991) and that some researchers view as the only proper type of theory. Extending that thought, Alter (2015c) responds in detail to Niederman and March's (2014) suggestion that WST is not a proper theory and would be more valuable if recast in a Gregor type IV mold. Those discussions are beyond this paper's scope.

1) Definition of work system: a system in which human participants and/or machines perform work (processes and activities) using information, technology, and other resources to produce specific product/services for specific internal and/or external customers.



2) Work system framework   3) Work system life cycle model

Figure 1: Three central components of work system theory (Alter, 2015c)

Information systems as work systems. Work system is defined in Figure 1. Information systems are work systems whose activities are all devoted to processing information, i.e., capturing, capturing, transmitting, storing, retrieving, deleting, manipulating, and displaying information. Work systems are sociotechnical by default, but can be totally automated. Overcoming longstanding definitional confusions, the definition of work system implies that an IS may be a sociotechnical work system or a totally automated work system. (Alter 2008)

Work system framework and work system life cycle model. Figure 1 shows the work system framework and work system life cycle model (WSLC), which are explained in depth in Alter (2013) and therefore will not be explained here.

Work System Metamodel. Figure 2 is the fifth version of a metamodel designed to compensate for limitations of the work system framework, which is useful for summarizing a work system and achieving mutual understanding of its scope and nature, but is less effective as a tool for detailed analysis. As illustrated by Alter (2010; 2012a) a full explanation of the metamodel would fill the entire length of this article. The metamodel is shown because it supports paths for thinking differently about IS and IT.

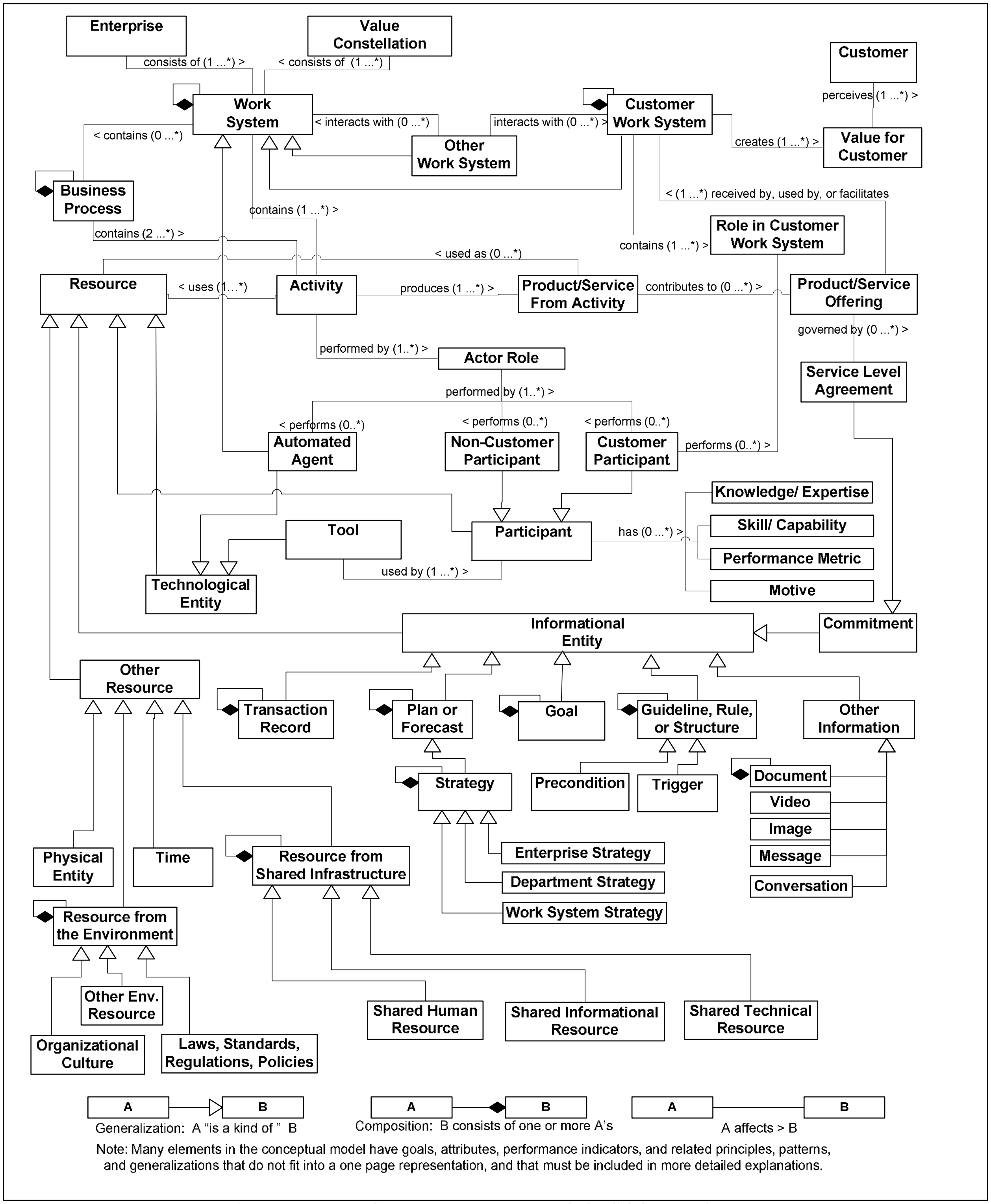


Figure 2. Work system metamodel (fifth version)

Paths for Thinking Differently Implied by WST and the Work System Metamodel

This section summarizes how WST and the work system metamodel support thinking differently about each of the 10 topics mentioned in the introduction. In some cases, a work system perspective extends existing ideas. In other cases, it shows why mainstream thinking ignores important issues.

Thinking differently about IS as a system-related discipline. "It is no exaggeration to describe most IS researchers as having used the term 'system' or 'systems' to refer to just about anything that involves electronic information processing." (Lee 2010). Treating the concept of system so loosely creates a disconnect between the "discipline's espoused theory of itself as a systems discipline and its theory-in-use of itself as a non-systems discipline" (p. 341). That disconnect fosters neither rigor nor relevance in research. For example, system design research might be about software design or about the design of a sociotechnical system with human participants.

By including 'automated agent" as a possible actor role, the metamodel (Figure 2) says that work systems may be sociotechnical or totally automated. The metamodel's quasi-symmetric treatment of those possibilities supports analysis and design efforts that decompose sociotechnical work systems into subsystems that may be sociotechnical or totally automated and that may be decomposed further by using the same metamodel.

Thinking differently about system usage. Burton-Jones and Gallivan (2007) says, "Unfortunately, system usage does not have a rigorous definition at any level ... we suggest that system usage at any level of analysis [individual, group, or organizational] comprises three elements: a *user* (the subject using the IS), a *system* (the IS used), and a *task* (the function being performed) ... We draw on these elements to define system usage as *a user's employment of a system to perform a task*."

A work system perspective would clarify whether "the system" being used is a technical artifact or a sociotechnical work system. Even that possibility seems paradoxical in a discipline that claims to study sociotechnical systems. The metamodel shows the shortcoming of treating the term "system usage" as a synonym of tool usage by identifying two guises of technological artifacts, tools that are used by users and automated agents that operate autonomously after being launched.

Thinking differently about sociotechnical systems. Recent papers continue debates about the sociotechnical versus technical nature of IS. Mumford (2006) reiterates the traditional sociotechnical design goal of jointly optimizing social and technical systems. Sarker et al. (2013) explores whether the academic IS discipline has been faithful to that traditional sociotechnical paradigm. Winter et al. (2014) proposes an updated sociotechnical framework (neo-STS) that recognizes how work and infrastructures may be distributed across multiple organizations.

WST addresses this issue by eliminating the assumed separate existence of social and technical systems. IT-enabled "processes and activities" (see Figure 1) with human participants are both social and technical because process steps with technical content often are performed by people in social settings. The metamodel's distinction between tools with affordances for users versus automated agents that perform work autonomously illustrates that technology itself may have social and technical aspects. The metamodel also says that an activity may use informational resources including transaction records with technical characteristics and social information such as goals, commitments, and conversations. Thus, WST says that the social and technical are intertwined and that problems are work system problems rather than specifically social or technical issues. It is more useful to ask why a work system operates as well as it operates or how to improve it. (See related ideas in Markus and Silver 2008.)

Thinking differently about how systems change over time. The WSLC (Figure 1) describes how work systems evolve through a combination of planned and unplanned change. In contrast, the "system development life cycle" (SDLC) describes a project rather than an operational system's lifecycle. Some current versions of the SDLC contain iterations, but even those are basically iterations within a project. "The system" in the SDLC is a basically a technical artifact that is being created. The system in the WSLC is a work system that evolves through multiple iterations that combine defined projects and incremental changes from small adaptations and experimentation. In contrast with the control-oriented SDLC, the WSLC treats unplanned changes as part of a work system's natural evolution.

Thinking differently about system development and systems analysis and design. The assumption that the IS discipline studies sociotechnical systems becomes murkier when the topic shifts to system development and systems analysis and design. Most systems analysis and design books treat systems as technical artifacts that operate through hardware, software, network infrastructure, user interfaces, and databases. Both in practice and academia, system development is typically viewed as creating and installing technical artifacts based on requirements that may come from analyzing sociotechnical systems. The disconnect occurs when "the system" is viewed as a technical system instead of a sociotechnical work system that needs improvement. With the latter approach, potential interventions include not only software improvements but also changes in processes, management, training, incentives, and other factors.

Analysis and design from a work system perspective consistent with the WSLC (Figure 1) and the WSM focuses on topics that are ignored or minimized in typical systems analysis and design texts (Alter 2013). It starts with identifying the smallest work system that has the problems or opportunities that launched the analysis. The "as is" system is a work system that requires improvement. The "to be" system is a work system that is likely to meet performance goals. The analysis focuses on the structure of the "as is" work system (including processes, technologies, and information) and the relevant performance gaps, key incidents, customer needs, and so on. Six Sigma techniques such as Pareto charts, fishbone diagrams, and value stream mapping are just as relevant to the analysis as IT-oriented methods from systems analysis textbooks. The resulting project is a set of activities for moving from the "as is" work system to the "to be" work system. Production, improvement, or installation of software is only a step toward implementation of the new work system. From that viewpoint, the "use cases" that are sometimes treated as documents for communicating with users should be replaced by work system summaries that provide a much richer understanding of what users and other stakeholders really care about. Those work system summaries could form the basis of use cases that programmers use later.

The inward-facing arrows in the WSLC raise challenges for both systems analysis and design and system development. A work system perspective assumes that emergent change is likely to occur as part of a work system's natural evolution. Work system designers should not assume that a work system will operate in accordance with its idealized specifications after the initial implementation. A more realistic assumption is that emergent change will occur and that the design of a work system should consider foreseeable directions for emergent change, including foreseeable workarounds and noncompliance (Alter 2014; 2015a; 2015b). A potential research direction involves developing guidelines, checklists, and heuristics for identifying likely directions for emergent change and channeling emergent change in beneficial directions.

Thinking differently about user participation and IS/IT projects. Enterprises consist of multiple work systems that produce their own product/services (often for internal customers). Projects designed to improve business results directly, i.e., not by creating technical infrastructure, are work system projects even if IT changes are required. The goal is to improve work system performance, not to produce software or implement IT applications. An important reason for the widely discussed difficulties of completing IS/IT projects on time and within budget is that attaining business benefits involves much more than creating, improving, and installing software.

The centrality of business results implies that the notion of "user participation" (e.g., see Markus and Mao 2004) is often misleading. The primary issue is not about the potential use of technical artifacts. Rather, it is about how work system participants will work more efficiently and effectively regardless of whether they will be direct users of technical artifacts that support activities within the work system.

Thinking differently about attaining value from IS and IT. Trying to assess business results with and without IT often is meaningless because most work systems rely upon IT in order to operate. Asking about the business value of IS and IT in many situations is like asking about the transportation value of a car's tires. The car simply cannot operate without tires. Looking for value perceived by customers extends this idea. The path from resources to value in Figure 2 shows that value for a work system's customers does not come directly from IS and IT. Rather, it comes from one or more work systems whose product/service offerings facilitate value for customers and from customers' value creating work systems.

WST also helps with longstanding concerns about attaining more value from ERP. An organization's ERP software is technical infrastructure shared across multiple work systems, ideally leading to organizational benefits of integration, communication, and creation of a single official version of organizational data. The ERP software modules used in a work system are part of that work system's technology. Regardless of enterprise-level benefits of having ERP, additional value related to individual work systems may require additional effort in analyzing the work system's performance and recommending changes that improve its performance, sometimes by working around ERP software or addressing other issues.

Thinking differently about IS success. The DeLone-McLean IS success model (DeLone and McLean 1992) has been cited over 7,500 times and has been discussed and critiqued in many ways. The original model says that "system use" and user satisfaction are both related to system quality and information quality and that use and user satisfaction lead to individual and organizational impacts.

WST raises many questions about this model, which implies that an IS is a technical artifact (hence "system use") and that system quality and information quality are independent, i.e., that IS quality is independent of the quality of information that it contains or produces. Figures 1 and 2 treat "the system" as a work system and information as one type of work system component. Individual and organizational impacts are primarily from the work system as a whole, not from technology that it uses. WSM's attention to multiple performance gaps rather than a singular concept of success implies that systems analysis should not focus on a single success measure. It should identify gaps between goals and performance for many different internal metrics (e.g., operational cost, speed, consistency) and external metrics (e.g., cost to customers, quality of product/services, and responsiveness). The multi-faceted nature of work systems implies that weighting schemes that combine multiple indicators into a single success measure for an IS or for any other work system are likely to be misleading because results may depend as much on the observer's preferences and weighting schemes as on the work system itself.

Thinking differently about business/IT alignment. Continuing in the decades-old tradition of bemoaning the state of business/IT alignment, McKinsey & Company (2014) found that IS groups were not meeting hopes and expectations for contributing to business results. Despite progress with agile approaches and other approaches, the goal of creating substantially better business/IT communication and collaboration remains an important opportunity.

WST might contribute to better business/IT alignment in several ways. It might be used with as a front-end for agile approaches and workshop methods. It might simply serve as a cultural change in thinking about systems as sociotechnical systems, not technical artifacts. WSM was developed to address this issue at the point where business and IT professionals collaborate about business issues related to IT-enabled systems. The goal was to facilitate communication by focusing on topics that were genuinely understandable by both groups and therefore could support more effective collaboration. Incorporation of WST into agile development methods, implementation of commercial application packages, and aspects of traditional software development might lead to greater alignment because more of the conversation would be about topics that business professionals understand and care about.

Thinking differently about IS theories and a body of knowledge for IS. Many IS researchers have emphasized the importance of finding and publicizing unique IS theories. That politically expedient goal may encounter a fundamental barrier because much basic knowledge related to IS is actually knowledge about work systems in general. For example, analysis of 228 risk factors in 46 representative articles about IS risk (Sherer and Alter 2004) found that 134 of them were relevant to work systems in general rather than IS in particular, e.g., management support, skills, and effective communication. That study and the fact that information systems and projects are special cases of work systems contributed to a proposed three dimensional "scaffolding" for a body of knowledge for IS (ISBOK) based on work systems concepts (Alter 2012b). One of the dimensions goes from work systems in general to special cases of work systems such as IS and projects. An untested hypothesis is that most components of cells for work systems in general will be inherited by special cases. Much, perhaps most of an ISBOK may be knowledge about work systems in general instead of knowledge specifically about information systems but not about work systems in general.

Supporting Linkages with Other Disciplines

Overlaps with other disciplines potentially contribute to innovation in IS research and practice. Figure 3 represents two things: 1) an area of significant overlap between IS and seven other disciplines and 2) areas of unique focus for all eight disciplines. The area where all of the disciplines overlap involves topics related to how systems operate and how systems change. That general territory is covered by WST (and by sociotechnical systems theory (e.g., Mumford 2006) and other approaches for understanding work in organizational settings). Table 1 reinforces the notion of overlap by identifying areas in which all eight disciplines touch topics related to elements of the work system framework. In contrast, Table 2 mentions topics that are associated with specific disciplines but that WST touches indirectly or not at all.

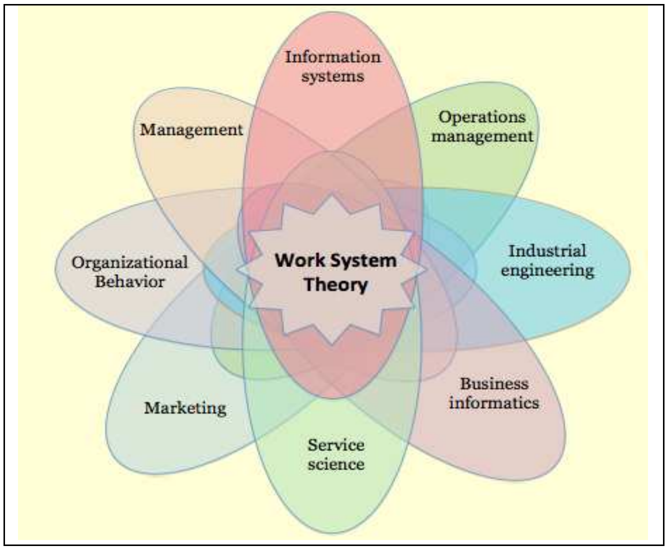


Figure 3. Work System Theory as an Area of Overlap between Eight Disciplines

Element of the work system framework	***Related topics that are significant in eight disciplines in Figure 3: information systems, industrial engineering, operations management, industrial engineering, service science, marketing, organizational behavior, and management***
Customer	Understanding and serving customer needs
Product/services	Designing and producing products/services that satisfy customer needs and that can be produced using current or future capabilities and resources
Processes and activities	Designing and maintaining processes and organization that strike an appropriate short term and long term balance between efficiency, effectiveness, and risk control
Participants	Understanding skills, knowledge, and capabilities required for performing tasks while also maintaining appropriately efficient, safe, and humane workplaces
Information	Understanding and providing the information that is needed to perform work efficiently, effectively, and reliably
Technologies	Understanding and providing technologies and other resources that are needed to perform work efficiently, effectively, and reliably

Table 1. How each discipline in Figure 3 touches elements of the work system framework

Discipline	***Important topics addressed indirectly or not addressed at all by WST***
Information systems	• Tools and methods specifically related to technical aspects of the work of systems analysts and software developers. • Application of IT in areas that might not be described as work systems, e.g., social media capabilities, enterprise infrastructure). • Positive and negative personal impacts, e.g., career possibilities or techno-stress • Role of CIOs and IT organizations in relation to traditional business functions • Quantitative and qualitative impacts of IT in general on businesses and society
Operations management	• Specialized models and methods, such as supply chain methods, Six Sigma methods, queuing theory, inventory theory, production planning and scheduling
Industrial engineering	• Methods related to engineering of factories and other production operations. • Ergonomics, work measurement.
Business informatics	• Tools and methods for conceptual modeling • Technical tools and methods for business process management (BPM) • Tools and methods for enterprise architecture and enterprise engineering
Service science	• Service viewed through a lens of co-production and co-creation of value • Links between service as activities and service as desired outcomes • Service computing, service-oriented architecture and service-oriented enterprises
Marketing	• Marketing communications • Market segmentation • Statistical analysis of marketing efforts
Management and Organizational behavior	• Using psychology and sociology to understand motivation and work behavior. • Leadership and motivation • Organizational control systems • Nature of work and communities of practice

Table 2. Areas of eight disciplines in Figure 3 that WST addresses indirectly or not at all

Focusing on commonalities of interest and substance goes beyond longstanding discussions of reference disciplines. Areas of overlap (see Table 1) could become a two-way conduit for importing and/or exporting ideas that can contribute to each of the disciplines without threatening to impinge on areas of uniqueness in each of the disciplines (see Table 2). This could facilitate interdisciplinary or multidisciplinary research by highlighting overlaps between disciplines while also highlighting areas not addressed by other disciplines. A direct and affirmative approach for facilitating the "marketplace of ideas" (King, 2013) could be more beneficial than yet another discussion of the status of IS relative to other disciplines.

Discussion and Conclusion

This paper's Blue Ocean idea is that WST and its extensions suggest a path toward thinking differently about IS and creating innovations related to overlaps between IS and other academic disciplines. The discussion of thinking differently within IS covered many prominent IS topics where starting from a different conceptual basis highlights different concerns and leads to new directions and new insights. The coverage of overlaps with other disciplines was limited to showing that WST is in an area of overlap that might lead to opportunities in research or practice. A more extensive discussion would identify specific commonalities of interest, thereby engendering synergy and collaboration between IS and other disciplines.

A new approach to longstanding problems. This paper's introduction mentioned issues that have been discussed for decades in the IS discipline. Using WST to approach those issues differently is a possible step toward moving beyond recurring, backward-looking scripts that produce inconclusive discussions and few actionable suggestions about generating more value.

WST says that systems of interest are IT-enabled work systems, not just IT systems or technical artifacts. Relevant theories are not just about IT or IS/IT. Including theories about work systems gives the academic IS discipline a richer basis to build upon because the theories come from areas of overlap with other disciplines. Analyzing and designing systems as work systems might generate more genuine involvement from business professionals and more empathy from IS professionals. The mystery of attaining more value from IS/IT might be cast differently if the system is an IT-enabled work system to be created or improved rather than a a technical artifact that is built, installed, and used or even a commodity that anyone can buy (e.g., controversial claims in Carr (2003) about IT investments). Instead of searching for unique IS theories, the IS discipline might break through its self-inflicted silo thinking by expanding its focus. It could look outward both for problems to solve and for ideas that lead to solutions. That might improve the discipline's long term status and health by generating more value for business and society.

No claim about optimality or universality. This paper treats WST as a potential path toward thinking differently about important topics. It does not claim that WST suggests an optimal path. There are many IS topics that WST touches only tangentially or not at all, such as sustainable competitive advantage from IS, non-systemic IT phenomena, pervasive computing, the digital divide, and phenomena related to learning and using technologies and IT applications. Alter (2013) mentions a number of theories or frameworks that overlap substantially with aspects of WST, such as general systems theory, sociotechnical systems theory, soft system methodology, actor-network theory, and activity theory. WST provides a direction for thinking differently about IS/IT, but surely it is possible that other alternatives might also cover the overlaps in Figure 3. The sociology of how disciplines evolve over time (e.g., Kuhn 1996) implies that the potential relevance of WST to important topics in IS and in other disciplines may or may not lead to extensive use. On the other hand, WST could form part of a platform for interdisciplinary opportunities for IS researchers.

Building on natural advantages in the marketplace of ideas. Fortunately the IS discipline has many natural advantages to build upon if it tries to pursue the directions suggested in this paper. One of the most important is its expertise in systems analysis and design. That expertise and the related concepts and methods can be augmented by ideas from other fields to produce much more powerful analysis and design methods that address broader problems. Some of those methods can be applied at an overview level that fosters communication and collaboration with business professionals from various disciplines. Other potential methods can be applied at a more detailed level that links directly with specialist tools for producing reliable mission-critical software and for producing minimum viable products where absolute reliability and complete features are not as important. The rigor of existing concepts and methods could form points of attachment or interaction for concepts and methods from other disciplines. In turn, those disciplines might find ways of benefitting from IS insights in and near areas of overlap.

Another natural advantage is a tradition of attention to the essential nature of IT as part of the fabric of business operations and everyday life. As IT becomes more and more pervasive, the IS discipline is in the best position to study IT and its impacts on business and society. A work system perspective is especially rich in this regard because it could help in seeing which new developments are genuinely systemic, which are more tool-like, and where to look for direct and indirect costs, direct and indirect benefits, and collateral damage. The same perspective could also help in distinguishing IS/IT implementation from work system implementation in a broader sense and in seeing how different types of systems change over time. Those topics are of substantial interest in all of the disciplines in Figure 3 and could become a springboard for wider and more generous cross-fertilization of concepts, efforts, and results.

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